Chunling Liu

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In this class, we watched and read several videos and articles, and accomplished several assignments and projects. We had learned how to build a digital physical system from brainstorming to physical fabrication, to turn our ideas into real product. In the assignment, Rock Paper Scissors, we learned how to use the laser cutter and the modeling software, Rhino. We learned how to brainstorm the ideas and how to sort the ideas in to categories in the assignment, Self Ethnography. In the assignment, Light Theramin, we learned how to use volume switch to volume up or down the sounds from the speaker. Then. We moved to a more advanced sensing technology using the ultrasonic ranger sensor and the RGB LED to achieve the Nervous Lamp assignment. All of these assignments helped us develop the knowledge of how digital physical system building process is, and allowed us to develop the skill we need to accomplish our final project.

In our first assignment, the Rock Paper Scissors, we were trying to create a simple interactive game between the user and the device. The user takes the move, and then wait for the device to response its move through LED signal. There are totally three LEDs on the box that each represents Rock, Paper, and Scissors. In this assignment, we learned how to use Rhino to design the physical object. For most of us, fabrication is very new to us. I am glad the teacher was very helpful and clear with all the instruction and steps. After we finish the adjustments on the model, we learned how to use the laser cutter to cut out the physical box, and it was a very fun experience watching the laser cutter function. Then, we followed the chart to assemble the board, and have the completed code uploaded to the arduino to work. However, an unexpected problem occurred when we are trying to put everything into the box. We found out the line were too short, and we will need to soldering each components with longer wires. After fix this little problem, everything works! We are glad that we are able to follow the instruction to complete this very first assignment. It helped us to learn the basic coding, to learn how to soldering and the laser cutter. Most importantly, it helped us develop the right attitude of finding problem and solving problems.

In the second assignment, the self-ethnography assignment, it provides us the opportunity to practice ethnography (observation and interview of individuals in-situ). It is important to know the users' needs and users' behaviors in order to build a better digital physical system. Designers can usually get design inspiration from the observation. For this observation assignment, we are told to observe our cars. Automobile is one thing that we use everyday, some people even stay on their vehicles longer than in another place, such as truck drivers or people who live in RVs. For most of people like us, we might use car for commute only, but if you pay close attention to it, you can found some of the driver's personal behaviors and preferences. For example, I found some letters and magazines in my car, because I like to take unopened letter or unread articles with me and read them whenever I am free from driving. After everyone shared their observation, we wrote down others idea on a piece of paste note, and attached them on the wall. This is a very interesting way to group the idea and sort all of the ideas into categories. The categories sorted from our ideas are ownership and pride, freedom/adventure and discovery, entertainment, control and comfort, safety, preparedness…etc. These categories later become our final project topics.

The third assignment, the light theramin, is a device that detects brightness of light as an input. Then transfer the value to an output noise tone depends on the level of lights. If the light is bright, the sound may just be less noise, nevertheless, if the light is dark, for example, covering by a hand, then the speaker will start to make loud noise sound. From this project, we can see the digital physical system does not only control by codes, but can also be controlled through add-on components. It will give the user more freedom modifies the input and output, and to have varies of different output results from different inputs. From this assignment, I learned that when you design a system, you shouldn't just think about how the user will use it, but also think what if the users want to change the way they use it. The system must be adjustable to satisfy all users and greater market.

The fourth assignment is very close to what we want to do in my group's taem project. It is a device uses ultrasonic range sensor to detect the distance. The set up wasn't too hard, but while we move forward to another levels, it gets harder and harder to code. The eventually outcome will have the RGB LED changing its colors when something is approaching to it. This

is a really fun project to do because you can actually see the changes of the colors without touching the device. Also, I was surprised by the verities of things can be done in different sensors or components. It is really a joyful experience to turn electronic parts into something practical and useful!

For the final project, my group thought a lot of different things from voice control system to ambient display system on the front windshield. However, although those ideas are great, they are not easy to accomplish in this class. So, we tried to think about the assignments we had done in this class. The blind spot detection device jumped into my mind right away. There are car crashes due to careless driving because of the blind spot all the time. I am simply wondered why the car manufacture never thought about something that can detect the blind spot for the drivers. Therefore, we decided to make one by ourselves. The early stage of our design process was very simple. Our goal is to successfully detect an approaching object. Then, we thought about a lot of ways to display the information to the users. Eventually, we think RGB LED light will do just fine in our project. In our originally idea, we thought we should use the infrared sensor and a switch to symbolize the turning signal switch. Whenever you tried to turn the lane to one direction, the device will automatically detect the road condition on that side for you. If there are no cars in the blind spot zone, the light will stay in green flashing light. If there is a car approaching or inside the blind spot zone, the LED light will turn from green to blue and red flashing light, and there will also be sounds coming from the speaker warning the driver. What we learned in this project is how to communicate in a team environment and how to cooperate with each other.

After all, I learned a lot in this class about the process of making the digital, and wish I will have another opportunity in the future to take another similar class to learn more about digital physical fabrication. The feeling of achieving something with your own hand and turn you idea into reality is like magic.